

Original article:

Evaluation of pulmonary function test before and after yoga practice in asthma patients

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ABSTRACT:

Back ground: Short drawn breathing is known as asthma. Bronchial asthma is a chronic inflammatory pulmonary disease in which air sacs loose their shape and become floppy. Anti-asthmatic drugs may have some adverse effects whereas Yoga can increase pulmonary function without having any harmful effect on body. In present study 40 asthma patients (20-40 years) were selected on the basis of inclusive and exclusive criteria, and PFTs were done by computerized spirometer before and after eight weeks of yoga training. The statistically significant ($P < 0.001$) increase in the observed values of FVC and FEV₁ was obtained after yoga practice in asthma patients. This may be due to the fact that yoga practices strengthen the respiratory muscles, increase elasticity of pulmonary tissue and enhance the blood circulation to them. So, it may be concluded that yoga practice may be beneficial for the treatment of asthma as it is inexpensive, having no harmful effects and useful for improving pulmonary functions in many ways.

Materials and methods: The total numbers of subjects in this study were 40 divided into two groups. Group-I Asthma patients within the age group between 20-40 years before yoga practice. Group-II The same asthma patients after yoga practice. The present study is designed to observe the pulmonary function tests in asthma patients after yoga practice.

Results: Our study shows statistically significant increase in observed value FVC after 8th week of yoga and significantly increases in observed value of FEV₁ in Group-II.

Conclusion: We may conclude that yoga is useful for improving pulmonary function tests in asthma patients, however only observed values of FVC and FEV₁ are significantly increased in this investigation.

Key words: Asthma, asthma patients, pulmonary function tests

INTRODUCTION:

Asthma is a Greek word that means panting, gasping or short drawn breath. Bronchial asthma is a chronic inflammatory disease of the airway that is associated

with airway hyper responsiveness that makes it difficult to breathe properly. It also has psychosomatic imbalance and an increased vagal tone as its etiopathogenesis (1). In asthmatic patients, airways

and air sacs have lost their shape and have become floppy. Their bronchi and alveoli collapse, rather than expand when air flows through them, as a result, they can inhale and exhale less.

In world, around 5% of adult population and 10% of children are known to be affected by asthma. Bronchial asthma is characterized by dry cough, feeling of heaviness in the chest, wheezing (hissing or whistling sounds during exhalation), breathlessness (expiratory difficulty), and shortness of breath (dyspnea). Asthma is exacerbated by various factors like environmental factors, infection, occupational factors (2,3) cold exposure, exercises etc. Many anti-asthmatic drugs (inhaled or oral medicine) are available in the market but these drugs are expensive and may have adverse effects. Recently complementary or alternative medicine (CAM) therapy which is a non-pharmacological enhances the probability of health consciousness with a positive outcome. Since the beginning of time, human have employed rituals, folk medicines and various techniques performed by shamans and other traditional healers of their cultures in an effort to potentiate their abilities to survive (4). Yoga is not only a part of modified medical science but also is considered as CAM therapy in the United States, has been a part of the health system in India for more than 7000 years (4,5). Yoga includes some techniques such as breathing exercises, pranayama, meditation, and asanas (6). The practice of yoga accompanies a number of beneficial physiological effects in the body. Pranayama is an art of controlling the life force of breath(7). It produces many systemic psychophysical effects in the body, besides its specific effects on the respiratory functions. Yoga therapy readjusts the autonomic imbalance, controls breathing and thus normalizes

various physiological variables (8). Many studies have reported that the practice of yoga for bronchial asthma has significantly improved pulmonary functions, quality of life and reduced air way hyper-reactivity, frequency of attacks and medication use(9). Pulmonary function tests are simple screening procedures, which are performed by using a standardized equipment to measure the lung functions. Pulmonary function tests using a computerized spirometer assess all the parameters of respiratory functions and give an idea about respiratory status. Pulmonary function tests are used to confirm the diagnosis and determine the severity of disease. Therefore, these changes can be observed even before the disease becomes symptomatic by an assessment of pulmonary function tests. The present study was aimed to evaluate the pulmonary function tests in patients with bronchial asthma before and after eight weeks of yoga practice.

MATERIALS AND METHODS:

The present study was carried out in Patanjali Yoga Centre, near Annarao circle, Tirupathi, AP, India.

The subjects were selected on the basis of inclusive and exclusive criteria. The study population included 40 individuals.

Inclusion criteria:

Group 1: Asthma patients within the age group between 20-40 years before yoga practice.

Group 2: The same asthma patients after yoga practice.

Exclusion criteria:

- The asthma patients having diseases viz. diabetes mellitus, tuberculosis, hypertension and the habit of drug addiction were excluded from the study.

Experimental design:

- The physical examination was carried out in participants, which includes the followings:
- The height (cm) of each subject was measured by an anthropometric rod (10) by allowing the subject to stand straight on a plane surface. They were instructed to look forward during the measurement.
- The weight (kg) of each subject was measured by conventional weighing pan(10,11,12). They were instructed to stand upon it and to look forward. Weighing pan was reset to zero before each measurement.
- The body mass index (or Quetelet Index) is the statistical measure which compares a person's weight and height by the following formula (12): $BMI = mass (kg)/(Height in m)^2$. The WHO(13) regard a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems, while a BMI greater than 25 is considered overweight and above 30 is considered obese.
- Pulse rate: It is examined by palpating radial artery for one minute(12,13).
- Blood pressure: It is examined by auscultatory method using sphygmomanometer(14,15).
- The Pulmonary function test (PFT) was performed in asthma patients before and after 8 weeks of yoga practice by computerized spirometer.

- Yoga exercise: The following Asanas were practiced during Yoga exercise to maintain proper procedure(16):
Bhujangasana, Parvatasana, Ushtrasana, Supta Vajrasana, Shavasana, Marjarisasna, Kapalbhathi and Anolom-viloma

Statistical analysis:

All values obtained were expressed as Mean \pm Standard Deviation. Student's t- test was performed and a 'p' value <0.05 was considered as statistically significant. Statistical analysis was performed using SPSS for windows version 11.5.

Recording of pulmonary function test:

The subject was asked to sit comfortably in a chair. The complete procedure was explained, all doubts were cleared. Subject was instructed to take a deep inspiration with nostrils closed and expire forcefully as fast as possible with lips sealed around the sterile mouthpiece of spirometer. Best of three readings were taken for interpretation.

RESULTS

Diagram1 shows mean and SD of age and BMI of the subjects among Group-1(Group-1) and Group-2(Group-2) before and after Yoga training. Diagram2 shows mean and SD of pulse rate, Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) of the subjects among Group-1 and Group-2 before after Yoga training.

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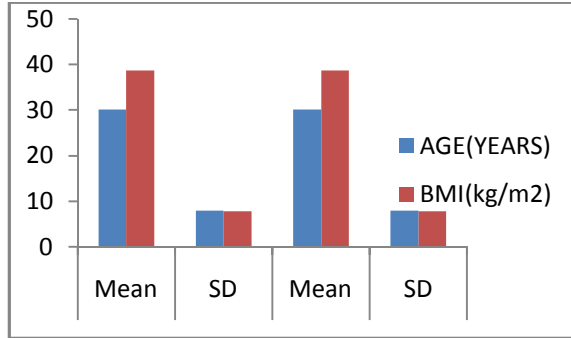


Diagram 1: Mean and SD of Age and BMI among G1, G2 before and after yoga training

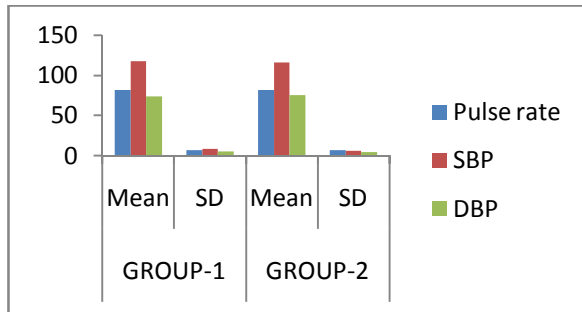


Diagram 2: Mean and SD of pulse rate, SBP and DBP among Group-1, Group-2 before and after yoga Training

Table1: Mean, SD, P values of parameters among Group-1, Group-2 before and after yoga training

PARAMETERS		GROUP-1		GROUP-2		P-VALUE
		Mean	SD	Mean	SD	
FVC	Predicted	2.89	0.37	2.92	0.40	0.73
	Observed	1.74	0.22	2.00	0.27	0.001
FEV ₁	Predicted	2.55	0.30	2.62	0.33	0.32
	Observed	1.69	0.24	1.97	0.28	0.001
FEV ₁ /FVC	Predicted	87.46	2.51	87.96	2.20	0.34
	Observed	96.44	9.57	98.50	3.33	0.20
FEF _{25-75%}	Predicted	2.89	0.33	2.93	0.38	0.61
	Observed	3.18	1.02	3.39	0.79	0.30
FEF _{75-85%}	Predicted	0.90	0.39	1.00	0.48	0.30
	Observed	1.99	0.69	2.20	0.65	0.16
PEF	Predicted	5.33	0.64	5.39	0.61	0.66
	Observed	4.16	1.48	4.66	1.17	0.10

Table 1 shows values of some parameters of Pulmonary function test in two groups before and after Yoga training. The FVC predicted values are 2.89 ± 0.37 in Group 1 and 2.92 ± 0.40 in Group 2 ($P=0.73$). The FVC observed values are 1.74 ± 0.22 in Group 1 and 2.00 ± 0.27 in Group 2 ($P=0.001$). There was no statistically significant increase in predicted value of FVC whereas there was statistically significant increase in observed values of FVC in Group 2 subjects after 8 weeks of yoga practice.

The predicted values of FEV_1 2.55 ± 0.30 in Group 1 and 2.62 ± 1.97 in Group 2 ($P=0.32$). The observed values of FEV_1 1.69 ± 0.24 in Group 1 and 1.97 ± 0.28 in Group 2 ($P = 0.001$). There was no statistically significant increase in predicted value of FEV_1 whereas there was statistically significant increase in observed values of FEV_1 in Group 2 subjects.

The predicted values of FEV_1/FVC were 87.46 ± 2.51 in Group 1, and 87.96 ± 2.20 in Group 2 ($P=0.34$). The observed values of FEV_1/FVC were 96.44 ± 9.57 in Group 1 and 98.50 ± 3.33 in Group 2 ($P=0.20$). Therefore, there was no statistically significant increase in FEV_1/FVC in Group 2 subjects. The predicted values of $FEF_{25-75\%}$ were 2.89 ± 0.3 in Group 1 and 2.93 ± 0.38 in Group 2 ($P=0.61$). The observed values of $FEF_{25-75\%}$ were 3.18 ± 1.02 in Group 1 and 3.39 ± 0.79 in Group 2 ($P=0.30$). Therefore, there was no statistically significant increase in $FEF_{25-75\%}$ in Group 2 subjects. The predicted values of $FEF_{75-85\%}$ were 0.90 ± 0.39 in Group 1 and 1.00 ± 0.48 in Group 2 ($P=0.30$). The observed values of $FEF_{75-85\%}$ were 1.99 ± 0.69 in Group 1 and 2.20 ± 0.65 in Group 2 ($P = 0.16$). Therefore, there was no statistically significant increase in $FEF_{75-85\%}$ in Group 2 subjects. The

predicted values of PEF 5.33 ± 0.64 in Group 1 and 5.39 ± 0.61 in Group 2 ($P=0.66$). The observed values of PEF 4.16 ± 1.48 in Group 1 and 4.66 ± 1.17 in Group 2 ($P=0.10$). Therefore, there was no statistically significant increase PEF in Group 2 subjects.

DISCUSSION:

The present study is designed to observe the pulmonary function tests in asthma patients after yoga practice. Asthma is a distressing disorder of the bronchial tubes characterized by recurrent attacks of wheezing, coughing and a sense of suffocation resulting in difficulty in breathing(17). In the management of asthma through yoga(18), these psychic factors are brought before the conscious mind. Increase in anxiety can lead to hyperventilation this can thus precipitate or aggravate asthma(19). Yoga therapy readjusts the autonomic imbalance(20), controls the rate of breathing and relaxes the voluntary inspiratory and expiratory muscles (21,22,23). Yoga helps to improve the respiratory function by exercising respiratory muscles and also by its influence on the respiratory centers. The elasticity of lung tissue as well as flexibility of surrounding muscles can be increased by yoga practice which may increase lung capacity and pulmonary blood circulation. The yogic practices like kapalabati and pranayama are very useful in strengthening respiratory muscles. These would be valuable in delaying exhaustion in asthma attacks or respiratory insufficiency(24,25). A large group of scientists(26-29) also agreed with our present studies and they also revealed that to some extent some beneficial effect of yoga is there in case of asthma patients.

CONCLUSION:

Asthma is one of the commonest chronic obstructive pulmonary diseases. Breathing exercise of yoga is

non-competitive, personal, inexpensive and enjoyable activity, which can produce truly amazing results. Therefore, we may conclude that yoga is useful for improving pulmonary function tests in asthma patients, however only observed values of FVC and FEV₁ are significantly increased in this investigation.

The present study suggests that if the subjects practice yoga regularly for longer duration, then there may be further improvement in pulmonary functions. Yoga is one of the best treatments for asthma. It is non-pharmacological therapy and there is no any harmful effect in the body.

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